

KARYOTAXONOMIC STUDIES ON WILD BOLIVIAN
TUBER-BEARING *SOLANUM*, SECT. *PETOTA*. I.

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The wild tuber-bearing *Solanum* from Bolivia are one of the least known groups of the Sect. *Petota*, subsect. *Potatoe*. Here, the author gives some results of his studies, including field observations of morphology and habitat, geographical distribution, and chromosome number counts. Extensive examination of material deposited in European and North and South American herbaria was also made. The species have been grouped into seven series, and the synonyms are given for each species. The synonyms cited here are only the ones identified for each species within the Bolivian territory.

- I. SERIES ACAULIA Juz., Bull. Acad. Sci. U.R.S.S., ser. Biol. 2:316. 1937, *nom. nud.*; ex Buk. & Kameraz, Bases of Potato Breeding, 21, 1959.
1. *Solanum acaule* Bitt., Repert. Sp. Nov. 11:391-393, 1912.
- S. acaule* var. *subexinterruptum* Bitt., Repert. Sp. Nov. 11:393-394, 1912.
- S. acaule* var. *caulescens* Bitt., Repert. Sp. Nov. 12:453-454; 1913.
- S. uyunense* Card., Bol. Soc. Peruana Bot. 5: 33-35, 1956.
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The variability of this species has led to the naming of new entities in specific and intraspecific levels. Apparently, its natural crossability with other species across a wide geographical distribution (Argentina, Bolivia and Peru) has contributed to this diversity. All of the living collections of *S. acaule* made by the author in Bolivia have $2n=4x=48$ chromosomes.

II. SERIES CIRCAEIFOLIA Hawkes, Ann. and Mag. Nat. Hist., ser. 12, 7:702. 1954.

2. *Solanum circaeifolium* Bitt. Repert. Sp. Nov. 11:385-386, 1912.

Plant delicate, stem slender, long stolones and small white tubers, leaves glabrous or glabrescent to finely pubescent with simple blade or odd-pinnate with 1-2(-3) pairs of lateral leaflets. Flower white, corolla stellate to substellate. Fruit long-conic of acute apex. Distribution: From the surroundings of Sorata, 2650m, alt. in the department of La Paz, northwest Bolivia, towards the heights of Choro-Ayopaya, 3900m alt. in the department of Cochabamba and the vicinities of Valle Grande in the department of Santa Cruz, central-south Bolivia, mostly in cloud forest and scrub vegetation, in the shade of thickets or among rocks or stony soil on steep brush slopes. Chromosome number $2n=2x=24$. This species is divided into the following varieties:

2a. *Solanum circaeifolium* var. *circaifolium*

Plant up to 70cm tall, stem slender, weakly ascending, usually glabrous, flexuous, simple or branched; leaf rather long petiolate, usually glabrous, rarely glabrescent, simple or little dissected with

1-2 of very small lateral folioles and no interjected leaflets; pedicel somewhat puberulent articulated well above or near the middle, calyx slightly puberulent, style densely papillose on the lower half, filaments glabrous.

2b. *Solanum circaefolium* var. *capsicibaccatum* (Card.)
Ochoa comb. nov.

Solanum capsicibaccatum Card., Rev. Agr. Cochabamba, 2:35-36, 1944.

Compared with typical variety, var. *capsicibaccatum* has more and finer pubescent leaves, always with 1 or 2 pairs of lateral leaflets, narrower and longer elliptic folioles, style papillose or sometimes with scattered short hairs on lower half. This variety also has greater geographical and ecological distribution than var. *circaeifolium*. Chromosome number: $2n=2x=24$.

3b. *Solanum circaefolium* var. *latifoliolatum* (Ochoa)
Ochoa comb. nov.

Solanum circaefolium f. *lobatum* Corr., Wrightia 2:171, 1961.

Solanum capsicibaccatum Card. var. *latifoliolatum*
Ochoa, Phytologia 50(3):181-182, 1982.

With a large and very widely elliptic lanceolate terminal foliole and more well dissected leaves, 2-3 lateral pairs, very rarely as many as four pairs, pubescent, coarse hairs, mainly in the upper surface of the leaflets. Restricted to the Quime region in the province of Inquisivi in the department of La Paz. Chromosome number: $2n=2x=24$.

- III. SERIES COMMERSONIANA Buk., Bull. Acad. Sci. U.R.S.C., ser. Biol. 2:714. 1938, *nom. nud.*; ex Buk. & Kameraz, Bases of Potato Breeding 19, 1949.

SERIES GLABRESCENTIA Buk., Problemy Bot. 2, 1955 *nom. nud.*; ex Buk. & Kameraz, Bases of Potato Breeding 19, 1959.

SERIES TARIJENSA Corr., Tex. Res. Found. Contrib. 4:233, 1962.

SERIES YUNGASENSA Corr., Tex. Res. Found. Contrib. 4:220-222, 1962.

3. *Solanum berthaultii* Hawkes, Bull. Imp. Bur. Plant Breed. & Genet., Cambridge, 122, 1944.

Plants tall, branched, light green, very glandulous and pubescent. Corolla pentagonal to substellate from white or whitish to pale violet-blue. More closely related to *S. tarijense* than to any other species. Mostly in dry valleys of the eastern slopes of the Cordillera of Cochabamba or Tunari, towards Aiquile and Sucre, 2000-2800m alt., among *Acacias* and *Schinus* or in brushy mountain slopes and stony clayey soils. Chromosome number: $2n=2x=24$.

Prof. J.G. Hawkes has postulated that the probable origin of *S. berthaultii* is from a hybridization between *S. tarijense* and some blue-flowered mountain species from the *Tuberosa* series. However, up until now, it has not been possible to satisfactorily reproduce artificial hybrids similar to *S. berthaultii*, even when using *S. tarijense* in crosses with *S. sparsipilum*.

4. *Solanum chacoense* Bitt., Repert. Sp. Nov. 11:18, July, 1912.
- S. caipipendense* Card., Bol. Soc. Peruana Bot. 5(1-3):35-36, 1956.
- S. cuevoanum* Card., Bol. Soc. Peruana Bot. 5(1-3):36-37, 1956.
- S. arnezii* Card., Bol. Soc. Peruana Bot. 5(1-3):37-40, 1956.
- S. chacoense* f. *caipipendense* (Card.) Corr., Wrightia 2:172, 1961.

Plants up to 1m or more tall in shade and thickets, and 15-20cm tall in open fields. Leaves usually with 4-5 lateral pairs. Corolla stellate or substellate to pentagonal, pure white to yellowish or white with mauve acumens; small calyx with very short, almost apiculate, acumens. Fruits globose to ovate, light green spotted with small white spots.

Solanum chacoense is a highly variable species. Therefore, many taxa of different ranks have been created which has greatly confused its taxonomy. It is also the most widely distributed tuber-bearing species after *S. acaule* and has been found as a weed in many different places in Argentina, Brazil, Paraguay, Uruguay and southern Bolivia.

Although triploid forms of *S. chacoense* have been reported, the material collected by the author in Bolivia is exclusively diploid, $2n=2x=24$ chromosomes.

5. *Solanum tarijense* Hawkes, Bull. Imp. Bur. Pl. Breed. & Genet., Cambridge, 114-115, 1944.

Solanum zudaniense Card., Bol. Soc. Peruana Bot., 5:31-32, 1956.

Solanum trigalense Card., Bol. Soc. Peruana Bot.,
5:41-42, 1956.

Solanum berthaultii f. *zudanense* (Card.) Corr.,
Wrightia 2:184, 1961.

Plants of 60-80cm tall, aromatic, pubescent and puberulent, glandular. Leaves with 3-4 lateral pairs and several to many interstitial leaflets. Corolla stellate to substellate or pentagonal, always white or creamy white, calyx with long acumens. Fruit globose, green with scattered white spots.

Habitat is mostly in low, dry valleys with *Acacia* and *Schinus* trees associated with herbs in sandy loam soil. Between 2500-300m alt. Distribution: from the southeast of Cochabamba, Bolivia, to Catamarca Province in northern Argentina. All of the living material of *S. tarijense* collected by the author within the Bolivian boundary have $2n=2x=24$ chromosomes.

5a. *Solanum tarijense* var. *pojoense* (Card.) Corr.,
Wrightia 2:173, 1961.

Solanum vallegrandense Card., Bol. Soc. Peruana
Bot. 5:23, 1956.

Solanum vallegrandense var. *pojoense* Card., Bol.
Soc. Peruana Bot. 5:24, 1956.

Plants less vigorous than in the typical species, smaller and fewer dissected leaves, corolla stellate, only creamy white, calyx also smaller in the typical species. Distribution: mainly in Santa Cruz and Tarija, Bolivia, up to the Province of Salta in north Argentina. Chromosome number: $2n=2x=24$.

6. *Solanum yungasense* Hawkes, Ann. and Mag. Nat. Hist., ser. 12, 7:697, 1954.

Plant glabrous to sparsely pubescent, erect or decumbent nearly up to 2m tall; stem slender to stout, usually branched, widely winged, wings straight or sinuous; tubers white, 3.0-4.0cm long and 2.0-2.5cm thick. Leaves light green, long and narrow with 6-7 pairs of lateral leaflets narrowly lanceolate, few small interstitial leaflets. Corolla deeply stellate, 2.0-2.5cm diameter with narrow and long lobes. Fruit globose, light green, 1.5cm in diameter.

This species lives in a similar ecological area as *Solanum violaceimarmoratum* of the Conicibaccata series, but both are quite different. Habitat: in tropical or subtropical forests where the rainfall is abundant and the temperature varies from mild to rather warm. Distribution: from Nor Yungas of La Paz to the tropical region near Tambopata River in the Peruvian Department of Puno at 1300-1800m alt. where this species has been identified by the author for the first time. The ploidy level varies from $2n=2x=36$ chromosomes.

7. *Solanum flavoviridens* Ochoa, Am. Pot. Journal 57(8):387-390, 1980.

Plant vigorous, broadly spreading, stout, greenish-yellow, very glandulous, nearly 1m tall. Stem robust, erect, simple or branched, pilose. Leaves covered with dense, simple and glandular hairs as in *Solanum berthaultii*. Corolla substellate to pentagonal, white or creamy white. Fruit globose. Growing at edges of forests or thickets in the tropical regions of Camata, 1600-1800m alt., in the Province of Saavedra, Department of La Paz.

This species seems to be of a hybrid origin, involving species of the series *Commerstoniana*. If such would be the case, the progenitors could be *S. yungasense* crossed with a white-flowered form of *S. berthaultii*, or perhaps some unknown species, since the locality of *S. berthaultii* is distant and quite unlike the habitat of *S. flavoviridens*. Until further information is obtained, we prefer to maintain *S. flavoviridens* as it is.

8. *Solanum litusinum* Ochoa, *Phytologia* 48(3):229-232, 1981.

Plant up to 1m tall, erect; stem usually branched, sparsely pilose, winged. Leaves with few glandular hairs, 2-3 pairs of lateral folioles and 0-2 small interjected leaflets. Calyx light green, pubescent, with acuminate lobules. Corolla stellate, purple. Fruit globose to ovate, green. Growing in subtropical regions below 2000m alt. in low, rather dry, stony ravines near river banks of La Playa in the Province of Valle Grande, Department of Santa Cruz. Chromosome number: $2n=2x=24$.

- IV. SERIES CONICIBACCATA Bitt., *Repert. Sp. Nov.* 11: 381, 1912.

SERIES OXYCARPA Rydb., *Bull. Torrey Bot. Club* 51:146, 172, 1924.

9. *Solanum violaceimarmoratum* Bitt., *Repert. Sp. Nov.* 11:389. 1912.

Solanum violaceimarmoratum var. *papillosum*
Hawkes, *Bull. Imp. Bur. Pl. Breed. & Genet.*
Cambridge 12, 14, 113, 1944.

Plant up to 2-3m tall, stem slender, flexuous, often densely mottled with light purple, glabrous or slightly puberulent. Leaves pubescent, 2-4 pairs of lateral leaflets, and 0-4 interjected leaflets. Corolla rotate to rotate-pentagonal 2-3cm in diameter, bright purple to violet, calyx lcm long, glabrous to glabrescent. Fruit long conical with obtuse apex, 2.0-2.5cm long, pure green. Growing in cloudy forest, thickets, near streams, clearings of woods at 1800 to 3600m alt. Distribution: from Unduavi, Nor Yungas of La Paz up to Colomi and Incachaca in the Province of Chapare, Department of Cochabamba. In my opinion, *S. violaceimarmoratum* is quite different from the southern Peruvian species *S. buesii*, *S. santolallae* and *S. urubambae*, as well as from *S. laxissimum* of central Peru. Chromosome number: $2n=2x=24$.

V. SERIES CUNEOALATA Hawkes, Bull. Imp. Bur. Pl. Breed. & Genet., Cambridge 118, 1944.

10. *Solanum infundibuliforme* Phil., Anal. Mus. Nac. Chile, 2nd ed. Bot., 65, 1891.

Solanum infundibuliforme var. *angustepinnatum*
Bitt., Repert. Spec. Nov. 11:388, 1912.

Solanum platypterum Hawkes, Bull. Imp. Bur. Plant Breed. & Genet., Cambridge, 118, 1944.

Solanum microphyllum Hawkes, Bull. Imp. Bur. Plant Breed. & Genet., Cambridge, 118, 1944 (not *S. microphyllum* Dun., 1813).

Solanum glanduliferum Hawkes, Bull. Imp. Bur. Plant Breed. & Genet., Cambridge 118-119, 1944.

Solanum pinnatifidum Card., Rev. Agric., Cochabamba 2(2):33, 1944 (not *S. pinnatifidum* Lam., 1797; not Ruiz and Pavon, 1799).

Solanum xerophyllum Hawkes, J. Linn. Soc., Bot.,
53, 108, 1945.

Solanum infundibuliforme var. *albiflorum* Ochoa,
Phytologia, 46(4):223, 224, 1980.

Plant usually small, less frequently up to 30-40cm tall, stem erect or decumbent, simple or branched. Leaf imparipinnatisect to imparipinnate or sometimes lyrate; lateral leaflets usually 2-3 pairs decurrent on the rachis, linear or linear-lanceolate to lanceolate or narrowly elliptic-lanceolate. Corolla extremely variable in color and shape, from white to dark purple and from rotate to rotate-substellate.

Fruit globose, green or green mottled with white. Habitat: from subxerophytic scrub desert associated with cactus or thorny shrubs of low regions to colder and wet places of high mountains or puna associated mainly with *Stipa ichu*, 2400-4100m alt. Distribution: from northwest Argentina, south and central Bolivia to the northern Chile. Chromosome number: $2n=2x=24$.

VI. SERIES TUBEROSA Rydb., Bull. Torrey Bot. Club
51:146-148, Buk. & Kameraz, Bases of Potato
Breeding 18, 1959, sensu stricto. 1924,
nomen nudum.

SERIES ANDIGENA Buk. *ibid* 24, 1959.

SERIES TRANSAEQUATORIALIA Buk. *ibid*. 21, 1959.

SERIES VAVILOVIANA Buk. *ibid*. 18, 1959.

SERIES ANDREANA Hawkes, Bull. Imp. Bur. Plant
Breed. Genet. Camb. 50, 1944.

11. Solanum glandiae Card., Bol. Soc. Peruana Bot. 5:11, 1956.

Solanum torrecillasense Card., Bol. Soc. Peruana Bot. 5:15, 1956.

Plant stout, branched, light green. Stem erect or sub-decumbent, glabrescent, widely winged. Leaves odd-innate, 2-3-(4) pairs of folioles, 0-4 interstitial leaflets; terminal leaflet much larger than the laterals widely elliptic-lanceolate with acute apex and rounded base; pseudoestipular leaves; very large, showy flowers. Corolla subpentagonal, dark lilac, articulation of the pedicel above the middle or near the calyx. Fruit globose to ovate, green with sparse, small, white spots. Distribution: inter-Andean valleys of central Bolivia, from north of Chuquisaca to east of Cochabamba, between 2000 and 2600 m alt., common near cultivated fields, streams and thickets. Chromosome number: $2n=2x=24$.

12. Solanum oplocense Hawkes, Bull. Imp. Bur. Pl. Breed. & Genet., Cambridge, 119, 1944.

Plant rather small, 30-40cm tall, erect to decumbent, mostly rosette at the base when young; stem simple or branched with very narrow wings. Leaves with 3-4 pairs of lateral leaflets, coarsely pilose including the margins, 0-3 interstitial leaflets; lateral leaflets ovate to wide elliptic or elliptic, usually obtuse apex, rounded to broadly cuneate base; first upper pair of folioles decurrent on the rachis. Corolla violet, light purple or slightly bluish, pentagonal to substellate; articulation of the pedicel near the middle or slightly below the middle. Fruit globose to ovate, dark green with sparse, small, white spots. Distribution: from the Provinces of Mizque and Campero, south of Cochabamba, 2200m alt., to the heights of Oro Ingenio near 4000m alt. in the Province of Nor Cinti, Potosi, in Bolivia, as far south as the vicinities of Humahuaca in the Argentine Province of Jujuy at 3500m alt. Although it has usually been found in lower altitudes, associated with Cactaceae and other xerophytic or subxerophytic plants, it also grows in cold puna regions together with Stipa ichu, Werneria, Astragalus, and other

plants endemic to high altitudes. Chromosome number: although the chromosome number for this species has been reported to be diploid, that is, $2n=2x=24$ chromosomes including the samples originally collected in the type locality, the countings made in all the living collections studied here have two ploidy levels: $2n=4x=48$ or $2n=6x=72$ chromosomes.

13. *Solanum vidaurrei* Card., Bol. Soc. Peruana Bot. 5:26-30, 1956.

Plant very gracile, 15-60cm tall; stem erect, simple or branched, slender, sparsely pilose, without wings or with very narrow decurrent lines. Leaves with 3-4-(5) pairs of lateral folioles, linear lanceolate or narrowly elliptic-lanceolate, coarsely pilose like the margins which are slightly denticulate; the first upper pair of folioles decurrent on the rachis; interjected leaflets 0-5. Corolla subpentagonal to pentagonal or sometimes rotate, dark lilac to purple. Fruit globose to ovate, up to 2cm in diameter, dark green mottled with scattered white spots. Distribution: although the altitudinal limits of *S. vidaurrei* are between 2600 and 3400m alt., this species inhabits mostly xeric valleys of 2600-2800m alt., where the climatic conditions are rather mild and dry, growing associated mainly with Cactaceae and thorny plants. Its geographical distribution extends from south Bolivia to Santa Victoria in northern Argentina, right near the border with Bolivia. Chromosome numbers: two ploidy levels have been found $2n=2x=24$ and $2n=4x=48$ chromosomes.

14. *Solanum brevicaule* Bitt., Repert. Sp. Nov. 11:
390-391, 1912.

Solanum liriunianum Card. et Hawkes, Journ.
Linn. Soc. Bot. 53:106-108, 1945.

Solanum colominense Card., Bol. Soc. Peruana
Bot. 5:21-23, 1956.

Solanum achacachense Card., Bol. Soc. Peruana
Bot. 5:30-31, 1956.

Plant usually low, 20-25(-60)cm tall, bushy or erect spreading, densely and coarsely pilose along the stem, rather stout, simple or branched slightly rosette and flexuous at the base. Leaves coarsely pubescent, 3-4(-5) pairs of lateral folioles and few to many interjected leaflets. Folioles broadly ovate-elliptic to elliptic-lanceolate, apex obtuse to subobtuse or acuminate; base oblique, broadly rounded or very rarely subcordate. Pedicel articulation is not constant, sometimes above the middle, others near the middle or even below. Corolla rotate 3.5cm in diameter, dark purple to bluish-violet; fruit globose to ovoid, dark green, 2cm in diameter. Distribution: although *S. brevicaule* is found in almost all the Bolivian territory, from the highlands in the vicinities of La Paz at almost 4000m alt. to the valleys near Cochabamba, Sucre and Tarija between 2600 and 3000m alt., it is also found in the mountainous regions of the Provinces of Jujuy and Salta in Argentina. Thus, this species not only grows in Andean humid slopes, but it is also frequently found in lower and dryer ecological formations. $2n=2x=24$.

15. *Solanum leptophyes* Bitt., Repert. Sp. Nov. 12:
448-449, 1913.

Solanum spgazzinii Bitt., Repert. Sp. Nov. 12:
449-450, 1913.

- Solanum gourlayi* Hawkes, Bull. Imp. Bur. Pl.
Breed. & Genet., Cambridge, 120-121, 1944.
Solanum pachytrichum Hawkes, Bull. Imp. Bur. Pl.
Breed. & Genet., Cambridge, 121-122, 1944.
Solanum punoense Hawkes, Bull. Imp. Bur. Plant
Breed. & Genet., Cambridge, 123, 1944.

Plant small, 10-15(-35)cm tall, gracile; stem slender, erect, branched, slightly flexuous and shorter internodes towards the base, sparsely pilose. Leaves usually long and narrow, sparsely pilose, 4-5(-7-8) pairs of lateral folioles, (0-)5-11(-16) interjected leaflets; folioles usually narrowly elliptic-lanceolate or occasionally almost widely elliptic, obtuse or sub-acute apex, obliquely rounded to cuneate base. Peduncles short 2-4cm long, pedicel articulation near or above the middle.

Corolla rotate to subpentagonal, violet to light purple or violet-purplish. Fruit globose to ovoid green with 1 or 2 purple stripes. Distribution: widely distributed from the northwest of Argentina throughout Bolivia to the interior of southern Peru as far as the Province of Antabamba in the Department of Ayacucho in Peru. It habits xeric or subxeric valleys, growing in poor and stony soils together with *Acacia* sp and Cactaceae at altitudes of 2600-3000m. It extends to high, humid, Andean valleys up to nearly 4000m alt. Chromosome number: $2n=2x=24$.

16. *Solanum candolleanum* Berth., Ann. Sci. Agron. et Etrang. 3 Ser. 6th year, Vol. 2:184-185, 190. Paris, 1911.

Solanum mandonii A. DC., Bibl. Univ., Arch. Sci. Phys. et Nat., ser. 3, 15:438. 1886
(not *S. mandonis* van Heurk et Muell. in Heurk, Obs. Bot., 78, 1870).

Plant large, very robust, erect, more or less pubescent throughout, 1 m tall or more, stem thick, usually branched, widely winged. Leaves large and highly dissected, 4-5(-6) pairs of narrow lateral folioles and numerous interjected leaflets, folioles with subobtuse to subacuminate or acuminate apex, rounded to obliquely rounded base. Pedicel articulation well above the middle or to 6-7 mm below the calyx; calyx pilose with lanceolate lobes and long acumens; corolla rotate, large deep blue or dark purple; fruit globose to ovoid, large, 3.5 cm in diameter, green at the base, light green to almost whitish towards the apex, sometimes very sparsely mottled with white spots. Distribution: growing abundantly in the Bolivian provinces of Larecaja and Franz Tamayo, Department of La Paz, and also in the other side of Cordillera de Apolobamba, behind the great Palomani Peak in the Peruvian territory of the Puno Department. The altitudinal limits of this species are between 2700-3700 m. Grows in thickets, near river or stream banks, in shrubby crevices of medium altitude valleys or even in colder regions of puna limit near the *Stipa ichu* steppe. In addition to its similar geographical distribution and its great vegetatively resemblance of the foliage to some forms of *S. tuberosum* subsp. *andigena*, *S. candolleianum* produces abundant and very large tubers, up to 14 cm long, ovate or flat-ovate. It is quite possible that this species has played an important role in the evolution of some cultivated species. Chromosome number: two ploidy levels, $2n=2x=24$ and $2x=3x=36$.

17. *Solanum sparsipilum* (Bitt.) Juz. et Buk., in Vavilov, Theor. Bases Plant Breed., 3:11, 1937.

Solanum tuberosum subsp. *sparsipilum* Bitt.,
Repert. Spec. Nov. 12:152, 1913.

- Solanum sucresense* var. *brevifoliolum* Hawkes, Bull. Imp. Bur. Pl. Breed. & Genet., Cambridge, 51, 1944 nom. nud.
- Solanum anomalocalyx* Hawkes, Bull. Imp. Bur. Pl. Breed. & Genet., Cambridge, 126-127, 1944.
- Solanum brevimucronatum* Hawkes, Bull. Imp. Bur. Pl. Breed. & Genet., Cambridge, 127, 1944.
- Solanum lapazense* Hawkes, Bull. Imp. Bur. Pl. Breed. & Genet., Cambridge, 127-128, 1944.
- Solanum mollepujroense* Card. et Hawkes, Jour. Linn. Soc., Bot. 53:103, 1945.
- Solanum anomalocalyx* var. *llallaguanianum* Card. et Hawkes, Jour. Linn. Soc. Bot. 53:104, 1945.
- Solanum anomalocalyx* var. *brachystylum* Card. et Hawkes, Jour. Linn. Soc. Bot. 53:104, 1945.
- Solanum anomalocalyx* var. *murale* Card. et Hawkes, Journ. Linn. Soc., Bot. 53:106, 1945 (as var. *muralis*).
- Solanum ruiz-zeballosii* Card., Rev. de Agricultura, Cochabamba 11:13-14, 1968.

Plant vigorous, more than 1m tall, stem stout, erect to erect-ascending, usually branched, pilose throughout with scattered coarse hairs. Leaves with 3-4(-5) lateral folioles and with or without several interjected leaflets; folioles ovate-elliptic to broadly elliptic, narrowly decurrent on the rachis especially in the upper pair, obtuse to shortly acuminate apex, cuneate or rounded at the base. Pedicels articulated near or above the middle. Calyx rather small, 5-6mm, symmetric or asymmetric (bilabiate) with broadly elliptic-lanceolate apiculate lobes. Corolla rotate or rotate-pentagonal, usually small, 3cm in diameter, dark purple to violet or light blue. Fruit light green, 12-15mm in diameter.

Solanum sparsipilum grows usually as a weed in cultivated fields and waste places. It is a highly variable species. The author estimates that there are at least 10 synonyms in Bolivia alone, and 4 more in the Peruvian territory. Its general morphology bears a great resemblance to some representative forms of the cultivated tetraploid Group *Andigena* or *Solanum tuberosum* subsp. *andigena* (Juz. et Buk.) Hawkes. Therefore, it has been postulated that it has played an important role in the evolution of some of the cultivated species. Distribution: from southern Peru to central Bolivia, mostly in inter-Andean temperate valleys 2400-3000 m alt., in or near cultivated fields, grassy banks, waste places, and stone walls near farm houses. It can also be found, although with less frequency, at higher altitudes and in colder climatic conditions up to nearly 4200 m alt. Chromosome number: $2n=2x=24$.

18. *Solanum gandarillasii* Card., Bol. Soc. Peruana Bot. 5(1):16-20, 1956.

Plant small, bushy and spreading, 20-25 cm tall, light green, glabrous or glabrescent. Stem slender, suberect to semirosette. Leaves with 1-2(-3) lateral folioles and no interjected leaflets; terminal foliole very enlarged, lateral leaflets broadly ovate or broadly elliptic-lanceolate, rounded to subcordate at the base, obtuse to shortly acuminate at the apex. Pedicels articulate well above the middle; calyx strongly reflexed, widely oblong spatulate or liguliform leafy lobes; corolla rotate, white, small up to 2.5 cm in diameter. Fruit globose to ovoid, light green, sparsely white spotted, 15 mm long. Distribution: found only in central and southeastern Bolivia, Departments of Cochabamba, Chuquisaca and Santa Cruz, between 2000-2800 m mostly in xeric regions, in dry rocky soils associated with Cactaceae and *Acacia* forests or under thorny bushes. Chromosome number: $2n=2x=24$.

19. *Solanum sucrense* Hawkes, Bull. Imp. Bur. Pl. Breed. & Genet., Cambridge, 126, 1944.

Plant vigorous, stem stout, erect, branched, winged; leaves 3-4(-5) pairs of lateral folioles, 4-6 interjected leaflets; folioles widely elliptic-lanceolate to elliptic-lanceolate with long petioles. Pedicel articulation near or above the middle. Corolla light bluish-violet, 2.5-3.0 cm in diameter, pentagonal to sub-stellate with long, poorly delimited acumens; calyx small regular to symmetric or strongly bilabiate with shortly acuminate lobes. Fruit globose, 1.5-2.0 cm in diameter, deciduous, dark green or dark green mauvish towards the apex.

Solanum sucrense is considered a "weedy" species and vegetatively has a great resemblance to *S. sparsipilum* and to some forms of *S. tuberosum* subsp. *andigena*. Therefore, it may have played a role in the evolution of the cultivated species *S. tuberosum*, and as in the latter, it also has $2n=4x=48$ chromosomes.

In addition, my collection No. 11926, which is a topotype of *S. sucrense*, is highly valuable for its extreme resistance to all Potato X viruses, including PVX_{HB} (Brown, C.R., L. Salazar, C. Ochoa & C. Chuquillanqui, paper in print). Also, *Solanum sucrense*, in spite of being tetraploid, is self-incompatible but crosses easily with tetraploid cultivars, thus giving a new route in breeding for resistance against the PVX complex. Distribution: found only in Central Bolivia, Department of Chuquisaca, near Sucre, between 2600-3000 m alt. Growing in cultivated fields or as a garden weed, edges of corn fields or crevices of old walls. Common name "Alcco papa."

VII. SERIES MEGISTACROLOBA Card. et Hawkes, Jour. Linn. Soc., Bot. 53:93, 1945.

20. *Solanum boliviense* Dun. in DC., Prodr. 13(1):43, 1852.

Plant subrosette or caulescent, erect-ascending or spreading prostrate, sparsely pilose with coarse hairs; stem simple or branched, leaves simple or with a pair of very small, lateral folioles; leaf blade or terminal foliole large, elliptic to ovate or elliptic-lanceolate, obtuse to acute apex, broadly rounded to narrowly cuneate at base. Articulation of the pedicel above the middle. Corolla rotate-pentagonal to pentagonal, deep purple. Fruit globose, 2cm in diameter, usually dark green. Distribution: from Chuquisaca Department in central Bolivia to the Province of Salta, Department of Santa Victoria into northwest Argentina at altitudes of 1700-3400m. In wet forest edges, among shrubs in sand-clayey soil, stony slopes, common in crevices under humid forests of *Polylepis*, and also in higher altitudes associated with *Stipa ichu*. Chromosome number: $2n=2x=24$.

21. *Solanum megistacrolobum* Bitt., Repert. Sp. Nov. 10:536, 1912.

Solanum alticola Bitt., Repert. Spec. Nov. 12:5-6, 1913.

Solanum decurrentilobum Card. et Hawkes, Jour. Linn. Soc., Bot. 53:97-98, 1945.

Solanum toralapanum Card. et Hawkes, Jour. Linn. Soc., Bot. 53:98-99, 1945.

Solanum ellipsifolium Card et Hawkes, Jour. Linn. Soc., Bot. 53:100-101, 1945.

Solanum toralapanum var. *subintegriifolium* Card. et Hawkes, Jour. Linn. Soc. Bot. 53:99-100, 1945.

Solanum ureyi Card., Bol. Soc. Peruana Bot., 5:32-33, 1956.

Plant small, usually forming a rosette or less frequently suberect-ascending; stem weakly angled and straggling, sparsely to densely pilose. Leaf simple to oddpinnate or pinnatilobed to sublyrate with 0-1-3 (-5) small lateral folioles; terminal foliole usually very large and extremely variable in shape from suborbicular to broadly elliptic or oval-elliptic, or from oblong or oblanceolate to lanceolate, sometimes also rhomboid and even longly subespatulate, broadly rounded to obtuse-apiculate or very rarely subacute at the apex, broadly rounded to cuneate at the base; lateral folioles similar in shape to the terminal, but much smaller, sessile, and basiscopically decurrent on the rachis. Pedicel articulation above the middle or rather near the calyx. Corolla rotate or subrotate to pentagonal or rotate-stellate, purple to lilac. Fruit globose to broadly ovoid compressed, dark green, 2.5 cm in diameter.

Solanum megistacrolobum represents the type species of the series. Because it is very heterogeneous and variable, it has caused great difficulties in its classification. Some of the taxa listed above as synonyms could probably be transferred, in the future, to a lower rank, as a *variety* or a *form*, but should no longer be maintained as *species*. Distribution: this is a typical, high mountain species growing mostly between 3000-4000 m alt., in humid highlands on grassy banks, stone walls, among wet bushes and along streams; from the high plateau of the Cailloma Province, Department of Arequipa, and Lake Titicaca region of southern Peru through Bolivia to the northwest of Argentina. All the living samples of *S. megistacrolobum*, collected by the author in Bolivia have $2n=2x=24$ chromosomes.

The few remaining Bolivian species not included here will be treated in a forthcoming publication.



Solanum leptophyes Bitt. (Ochoa 11888)
near x 1/2

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